

Application No. 10/099,861
Docket No. DP-305031
Amendment dated January 22, 2004
Reply to Office Action of October 22, 2003

REMARKS

In the Office Action, the Examiner reviewed claims 1-43 of the above-identified US Patent Application, with the result that claims 1-8 and 12-15 were rejected under 35 USC §103 in view of U.S. Patent No. 4,778,733 to Lubrano et al. (Lubrano), claims 1-8, 12-20, 24-36, and 40-43 were rejected under 35 USC §103 in view of EP1180411 to Toshihiko et al. (Toshihiko), and claims 9-11, 21-23, and 37-39 (which depend from claims 1, 16, and 29, respectively) were deemed to recite allowable subject matter. In response, Applicants have amended the claims as set forth above. More particularly:

Independent claims 1, 16 and 29 have been amended to specify that the alloy does not exhibit a mushy zone above 222°C. Support for these amendments can be found in Applicants' specification at paragraph [0021] and in the Abstract.

Independent claims 1, 16, and 29 and their respective dependent claims 4, 7, 8, 13, 20, 25, 26, 32 and 41 have been amended to specify higher minimum silver and/or copper contents. Support for these amendments can be found in Applicants' specification on the basis that Applicants teach ranges that encompass the newly-claimed minimum contents. See MPEP 2163.05 III.

Applicants believe that the above amendments do not present new matter. Favorable reconsideration and allowance of claims 1-43 are respectfully requested in view of the above amendments and the following remarks.

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\$103 Rejection based on Lubrano

Under this rejection, independent claim 1 and its dependent claims 2-8 and 12-15 were rejected on the basis that Lubrano discloses an alloy comprising, in weight percent, 0.05-3% silver, 0.7-6% copper, the balance tin. Applicants respectfully traverse this rejection in view of the claims as amended and the following comments.

Applicants' claimed solder alloy is disclosed as being suitable for use with the alloy having reflow temperatures that are compatible with typical circuit board assembly processes. Paragraph [0003]. This object is achieved by formulating the alloy to have a copper content in a range that, apparently as a result of keeping the silver content of the alloy between 3.0 and 3.5 weight percent, preferably from about 3.1 to about 3.4 weight percent, the alloy exhibits a melting mechanism in which the alloy is essentially completely melted within a very narrow temperature of about 215°C to about 222°C (with the exception of CuSn IMC's) without exhibiting a mushy zone above these temperatures. The amount and distribution of the CuSn IMC's allow the alloy to reflow within the "effective" melting range of 215°C to 222°C, which permits the use of peak reflow temperatures well within the acceptable range of 240°C to about 260°C for circuit board applications. Paragraph [0021].

Under this rejection, the Examiner cited *Titanium Metals Corporation of*

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America v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) for the rule that

Actual overlap of all ingredients in the prior art is not required;
mere contact or close approximation is sufficient to establish a
prima facie case of obviousness.

Applicants note that the actual holding in *Titanium Metals* was that a prima facie case
of obviousness exists where

The proportions are so close that prima facie one skilled in the art
would have expected them to have the same properties.

In *Titanium Metals*, a claim directed to an alloy "having 0.8% nickel, 0.3%
molybdenum, up to 0.1% iron, balance titanium" was held to be obvious over a
reference disclosing two alloys: 0.75% nickel, 0.25% molybdenum, balance titanium;
and 0.94% nickel, 0.31% molybdenum, balance titanium. The prior art alloys straddle
the claimed alloy, such that the claimed alloy would be expected to have the "same
properties" as the prior art alloys.

In the present situation, Applicants' claimed alloy does not lie between
disclosed alloys, but has a silver content of at least 3.1% (with still higher silver
contents required by claims 7, 8, and 11-13) and therefore above the maximum silver
content allowed by Lubrano. Therefore, the circumstances here and in *Titanium Metals*
are not the same.

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Furthermore, the finding of obviousness in *Titanium Metals* was stated as being on the basis that "one skilled in the art would have expected [the claimed and prior art alloys] to have the same properties." However, Lubrano's alloy (for soldering pipes) and Applicants' alloy (for soldering electronic devices) do not have the "same properties" - Lubrano's alloy is disclosed as being mushy at temperatures up to 500°F (260°C) (see column 2, lines 46-49), whereas Applicants' alloy is now expressly claimed as not having a mushy zone above 222°C.

Finally, whether one skilled in the art would be motivated to increase Lubrano's silver content to arrive at Applicants' alloy is speculative. Because Lubrano's alloy is mushy at temperatures of up to 500°F (260°C) - an unacceptable property for the electronic soldering applications claimed for Applicants' alloy - those skilled in the art would be discouraged from attempting to use Lubrano's alloy for Applicants' claimed electronic soldering applications.

In view of the above, to arrive at Applicants' invention one skilled in the art would be required to modify the teachings of Lubrano by using higher silver contents than that suggested by Lubrano. However,

The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the *prior art* suggested the desirability of the modification. (Emphasis added.)

In re Fritch, 23 USPQ2D 1780, 1783-1784 (Fed. Cir. 1992).

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Lubrano provides no basis for a reasonable expectation of success for such a modification, contrary to the requirements of MPEP §2143.02. "The [references] disclose, at most, that one skilled in the art might find it obvious to try the claimed invention. But whether a particular combination might be "obvious to try" is not a legitimate test of patentability" *In re Fine*, 5 USPQ2D 1596, 1599 (Fed. Cir. 1988), citing *In re Geiger*, 2 USPQ2D 1276, 1278 (Fed. Cir. 1987). See also *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

For all of the above reasons, Applicants respectfully request withdrawal of the first rejection of the claims under 35 USC §103.

§103 Rejection based on Toshihiko

Under the second §103 rejection, independent claims 1, 16 and 29 and their dependent claims 2-8, 12-15, 17-20, 24-36 and 40-43 were rejected on the basis that Toshihiko discloses an alloy comprising, in weight percent, 0-8% silver, 0-5% copper, the balance tin. Applicants respectfully traverse this rejection in view of the claims as amended and the following comments.

Applicants first note that Toshihiko does not teach a solder alloy suitable for soldering applications having the composition cited by the Examiner. Instead, the cited composition is for a "Sn alloy powder" that is one of "a plurality of different types of

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metal powder" that "have a composition when melted of 1-5 mass% Ag, 0.5-3 mass% Cu, and a remainder of Sn." See the Abstract and paragraph [0037] of Toshihiko. Toshihiko does not disclose, and the Examiner has not established, that the "Sn alloy powder" is a "solder alloy" or has the melting characteristics required by Applicants' claims. Therefore, Applicants' following remarks will be directed to the solder alloy actually disclosed by Toshihiko, namely, 1-5% silver, 0.5-3% copper, the balance tin.

Under this rejection, the Examiner again cited *Titanium Metals Corporation of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985), which Applicants again note held that a claimed alloy was obvious over a reference that disclosed two alloys whose compositions straddled the claimed alloy, because the claimed alloy would be expected to have the "same properties" as the prior art alloys.

In the present situation, Applicants' claimed alloy does not lie between disclosed alloys, but has a copper content of greater than 3% (with still higher copper contents required by claims 4-6, 9-12, 17, 18, 21-24, 33, 34, and 36-40), and therefore above the maximum copper content allowed by Toshihiko. Therefore, the circumstances here and in *Titanium Metals* are not the same.

In view of the above, to arrive at Applicants' invention one skilled in the art would be required to modify the teachings of Toshihiko by using higher copper contents than that suggested by Toshihiko. However, Toshihiko provides no basis for a reasonable expectation of success for such a modification, contrary to the requirements

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of MPEP §2143.02. Instead, Toshihiko appears to teach away from attempts to make use of a tin-based solder alloy containing up to 5 weight percent silver and up to 3 weight percent copper (see paragraphs [0028] and [0029]). Therefore, while one skilled in the art might find it obvious to try increasing the copper content of Toshihiko's solder alloy and thereby arrive at Applicants' claimed invention, "'obvious to try' is not a legitimate test of patentability" *In re Fine*, supra.

For all of the above reasons, Applicants also respectfully request withdrawal of the second rejection of the claims under 35 USC §103.

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Closing

In view of the above, Applicants believe that the rejections to their claims have been overcome, and that the claims define patentable novelty over all the references, alone or in combination, of record. It is therefore respectfully requested that this patent application be given favorable reconsideration.

Should the Examiner have any questions with respect to any matter now of record, Applicants' representative may be reached at (219) 462-4999.

Respectfully submitted,

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